Claims

1. An apparatus for the electrodialytic regeneration of an electroless bath electrolyte comprising:

a first electrodialysis unit and a second electrodialysis unit, each unit having diluate compartments through which the bath electrolyte is channeled, and concentrate compartments through which a regeneration electrolyte is channeled;

two or more electrodes, comprising anode and cathode, in joint operation with the electrodialysis units;

wherein in the first electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent cations and on an anode side by membranes that are selectively permeable to all anions;

wherein in the second electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent anions and on an anode side by membranes that are selectively permeable to all cations;

wherein the diluate compartments of the first electrodialysis unit are serially connected to the diluate compartments of the second electrodialysis unit via first lines through which the bath electrolyte is sequentially channeled;

wherein the concentrate compartments of the first electrodialysis unit are serially connected to the concentrate compartments of the second electrodialysis unit via second lines through which the regeneration electrolyte is sequentially channeled;

wherein the electrodes are in electrode compartments which are separated from adjacent compartments by membranes and through which electrode compartments a rinsing electrolyte can flow via third lines; and

wherein one of said electrode compartments adjacent to the compartments of both electrodialysis units houses an electrode which is shared by both the first and second electrodialysis units.

2. The apparatus of claim 1 wherein the electrode that is shared by both electrodialysis units is an anode.

3. The apparatus of claim 1 wherein the electrode compartments contain a rinsing electrolyte which is an aqueous solution of a rinsing compound selected from Na_2SO_4, K_2SO_4, Na_2PO_3, , and mixtures thereof.

4. The apparatus of claim 3 wherein the concentration of the rinsing compound is in a range of from about 1 to about 30 g/L.

5. The apparatus of claim 1 comprising parallel lines leading from a main feeder line to said diluate and concentrate compartments of at least one of the electrodialysis units.

6. The apparatus of claim 1 comprising a closed loop line for passing the electrolyte through the diluate compartments of the electrodialysis units.

7. The apparatus of claim 5 comprising a closed loop line for passing the electrolyte through the diluate compartments of the electrodialysis units.

8. The apparatus of claim 6 comprising a collecting tank in the closed loop line for the electrolyte.

9. The apparatus of claim 6 comprising at least one heat exchanger in the closed loop line.

10. The apparatus of claim 6 comprising at least one filter through which the bath electrolyte passes.

11. The apparatus of claim 1 comprising a closed loop line for passing the regeneration electrolyte through the concentrate compartments of the electrodialysis units.

12. The apparatus of claim 11 comprising a collecting tank in the line system through which the regeneration electrolyte passes.

13. The apparatus of claim 6 comprising a closed loop line for passing the regeneration electrolyte through the concentrate compartments of the electrodialysis unit.

14. The apparatus of claim 1 comprising a closed loop system for channeling the rinsing electrolyte through the electrode compartments.

15. The apparatus of claim 6 comprising a closed loop system for channeling the rinsing electrolyte through the electrode compartments.

16. The apparatus of claim 11 comprising a closed loop system for channeling the rinsing electrolyte through the electrode compartments.

17. The apparatus of claim 13 comprising a closed loop system for channeling the rinsing electrolyte through the electrode compartments.

18. An apparatus for the electrodialytic regeneration of an electroless bath electrolyte comprising:

a first electrodialysis unit and a second electrodialysis unit, each unit having diluate compartments through which the bath electrolyte is channeled, and concentrate compartments through which a regeneration electrolyte is channeled;

two electrodes, comprising an anode and a cathode, in joint operation with said electrodialysis units;

wherein in the first electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent cations and on an anode side by membranes that are selectively permeable to all anions;

wherein in the second electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent anions and on an anode side by membranes that are selectively permeable to all

cations;

wherein the diluate compartments of the first electrodialysis unit are serially connected to the diluate compartments of the second electrodialysis unit via first lines through which the bath electrolyte is sequentially channeled;

wherein the concentrate compartments of the first electrodialysis unit are serially connected to the concentrate compartments of the second electrodialysis unit via second lines through which the regeneration electrolyte is sequentially channeled;

wherein the electrodes are in electrode compartments which are separated from adjacent compartments by membranes and through which electrode compartments a rinsing electrolyte can flow via third lines;

wherein one of said electrode compartments adjacent to the compartments of both electrodialysis units houses an electrode which is shared by both the first and second electrodialysis units;

a closed loop system for channeling the rinsing electrolyte through the electrode compartments;

a closed loop line for passing the regeneration electrolyte through the concentrate compartments of the electrodialysis units; and

a closed loop line for passing the electrolyte through the diluate compartments of the electrodialysis units.

SYSTEM FOR THE ELECTRODIALYTIC REGENERATION OF AN ELECTROLESS BATH ELECTROLYTE

Abstract of the Disclosure:

An apparatus for the electrodialytic regeneration of an electroless bath electrolyte. There are first and second electrodialysis having diluate compartments through which the bath electrolyte is channeled, concentrate compartments through which a regeneration electrolyte is channeled, and an anode and a cathode. In the first electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent cations and on an anode side by membranes that are selectively permeable to all anions. In the second electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent anions and on an anode side by membranes that are selectively permeable to all cations. The diluate compartments of the first electrodialysis unit are serially connected to the diluate compartments of the second electrodialysis unit via first lines through which the bath electrolyte is sequentially channeled. The concentrate compartments of the first electrodialysis unit are serially connected to the concentrate compartments of the second electrodialysis unit via second lines through which the regeneration electrolyte is sequentially channeled. The electrodes are in electrode compartments which are separated from adjacent compartments by membranes and through which electrode compartments a rinsing electrolyte can flow via third lines. One of the electrode